

I-5 SHIP CANAL BRIDGE NOISE STUDY



Washington State Department of Transportation

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Results at a Glance

What did the I-5 Ship Canal Bridge noise mitigation feasibility study find?

In 2004, the Washington State Department of Transportation completed a study of the I-5 Ship Canal Bridge in Seattle to determine how to reduce traffic noise. The study found that:

- Perceived noise could be reduced by more than 50 percent by constructing opaque sound absorbing walls on both freeway decks and hanging sound absorbing panels below the upper deck. This would deliver a substantial and noticeable noise reduction to people who live or work near the I-5 Ship Canal Bridge. Clear reflective materials can only produce noise reductions of two to ten decibels but maintain cityscape views. Opaque absorptive materials can achieve noise reductions of 13 to 19 decibels and is the preferred solution because of the greater noise benefit and anticipated lower cost. Both options include absorptive panels on the ceiling of the express lanes.
- Our preliminary ballpark costs were based on predictable material unit costs. Better costs cannot be predicted until we conduct further engineering and environmental studies. We have not yet addressed concerns such as stormwater control, ventilation (if needed) or visual/aesthetic treatments. Several WSDOT engineers familiar with planning level costs then reviewed the initial costs. They were asked to assess if these costs were appropriate to the very preliminary understanding of the actual work involved. They suggested that we double the costs to account for the risk associated with items described above, the unusual working environment, and conditions not yet known. This preliminary work indicates the ballpark costs would range from \$50 to \$70 million in current dollars. The work could be broken into a series of smaller projects ranging from \$8 to \$24 million each. The preliminary cost information will probably change as future environmental and engineering work is performed.
- The opaque noise walls would block scenic views, and improvements could affect the historic character of the bridge and may affect the environment during installation. Costs do not include provision to mitigate these negative effects.
- The Ship Canal Bridge ranks tenth out of 72 highway noise retrofit projects statewide.
- None of the noise attenuating materials evaluated are currently approved by WSDOT.

The average human ear notices noise reductions as small as three decibels; ten decibel reductions sound half as loud to the human ear, so 13 to 19 decibel reductions are quite substantial.

Why did we conduct the study?

- To determine where the I-5 Ship Canal Bridge ranks among noise retrofit sites statewide.
- To respond to neighborhood desires to determine reasonable options to reduce high noise levels.
- To take advantage of recently available noise modeling tools, which allow us to model the complex bridge environment and a variety of lightweight noise absorptive materials.
- To conduct the study while funding is available.

How would people benefit if we built the improvements?

- Substantially reduced noise.
- Added protection from debris falling off the highway.
- Improved outdoor environment near the bridge, particularly for people who are walking, bicycling, gardening, relaxing in their yards, etc.
- Enhanced economic development opportunities.
- Express lanes could be opened up for nighttime travel.

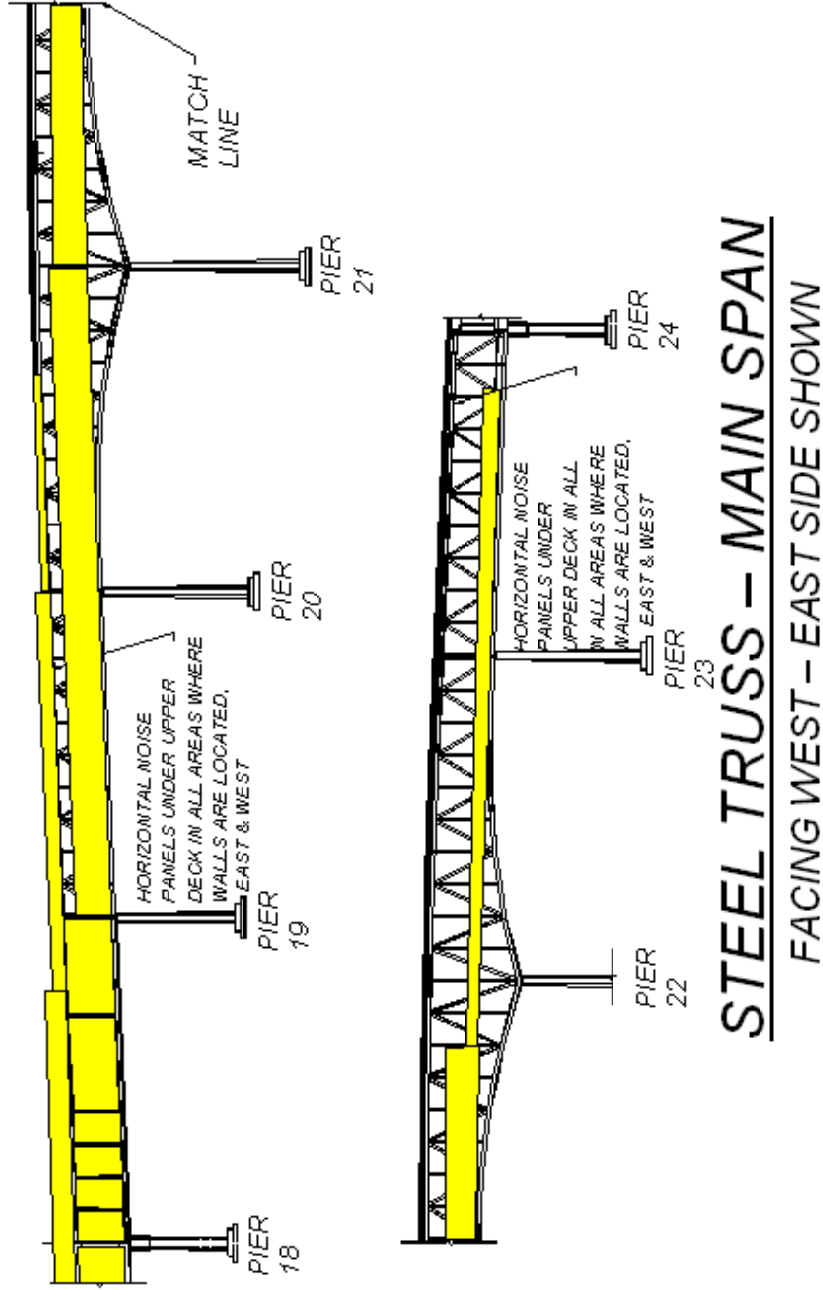
What happens next?

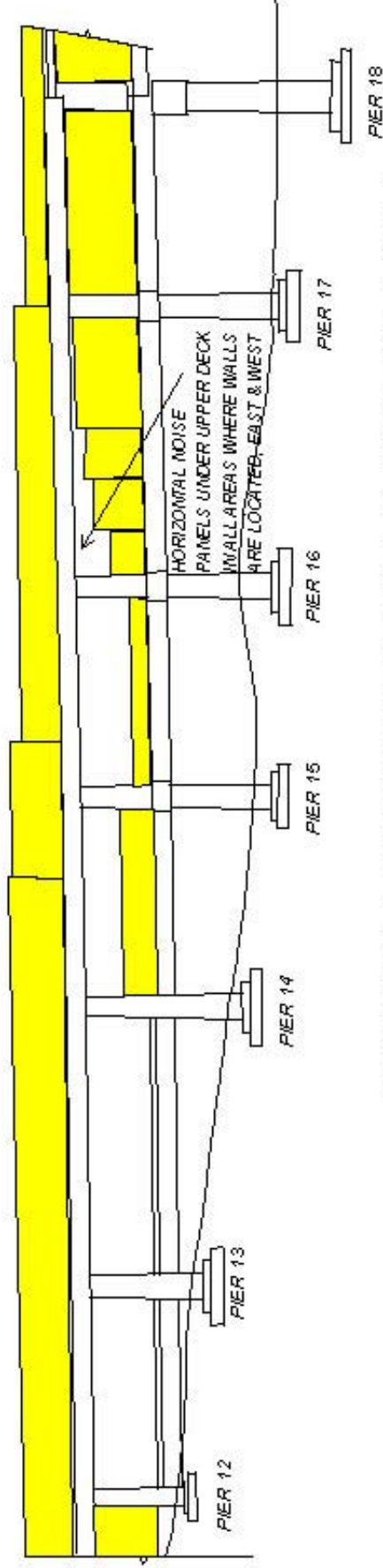
- Solicit input from citizens and businesses in affected neighborhoods, the City of Seattle, U.S. Federal Highway Administration, users of the bridge, and others.
- Pursue approvals to use lightweight material considered in this study.
- Further development of costs based on additional evaluation of the environmental, engineering, material, and maintenance issues.
- Brief elected officials and representatives, the Washington State Transportation Commission and others at WSDOT.



APPENDIX A: Diagrammatic Side Views of Proposed noise Walls

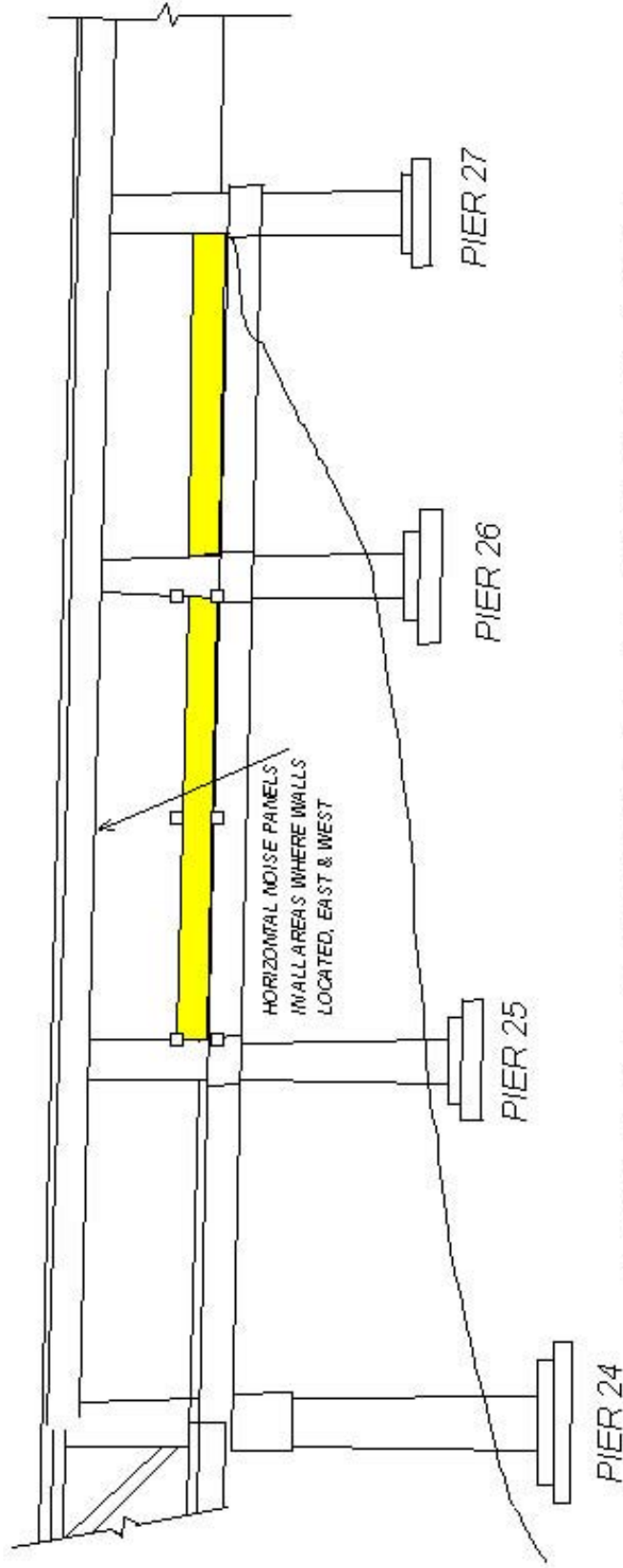
The yellow wall panels are on the east side of the bridge. The green wall panels are on the west side of the bridge (background).





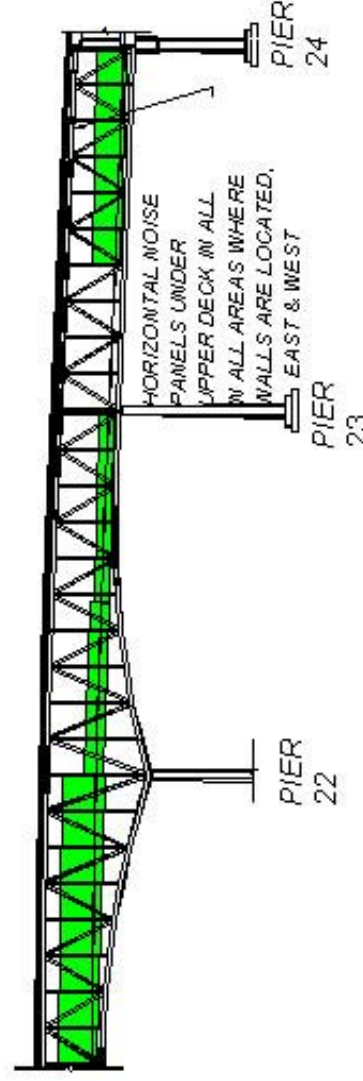
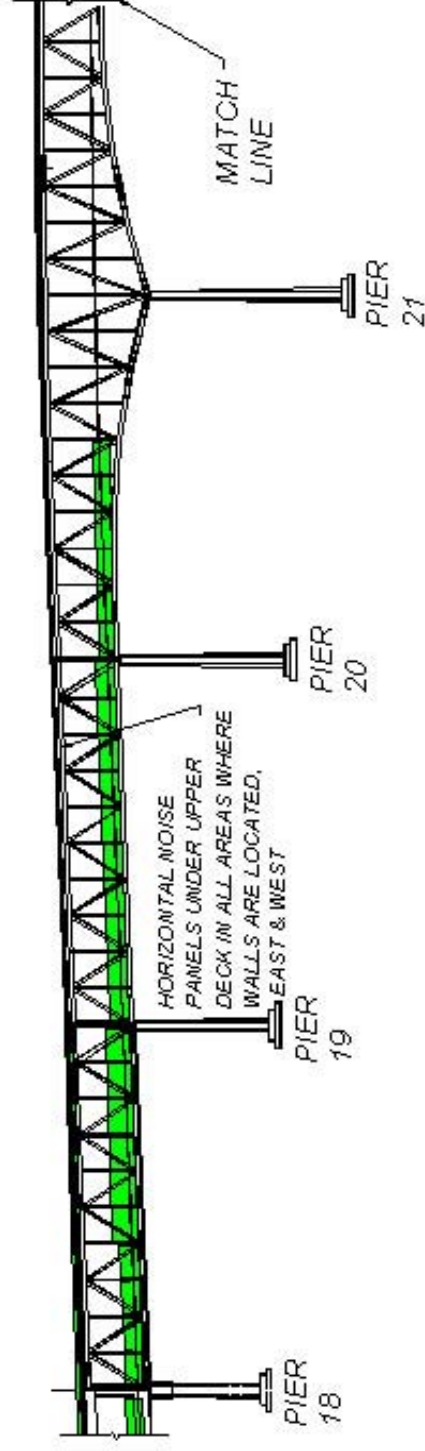
SOUTH CONCRETE APPROACH

FACING WEST - EAST SIDE WALLS SHOWN



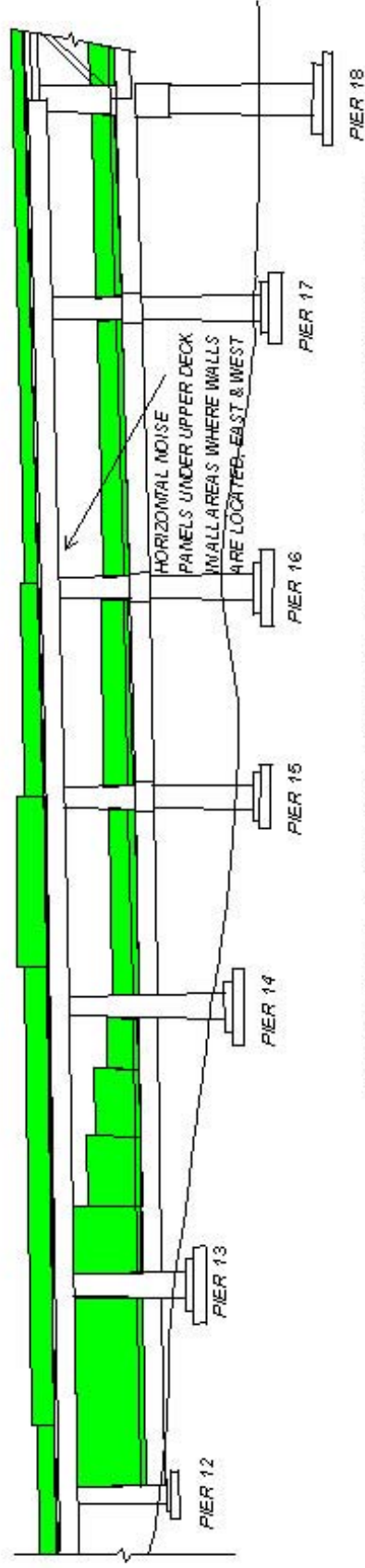
NORTH CONCRETE APPROACH

FACING WEST – EAST SIDE WALLS SHOWN



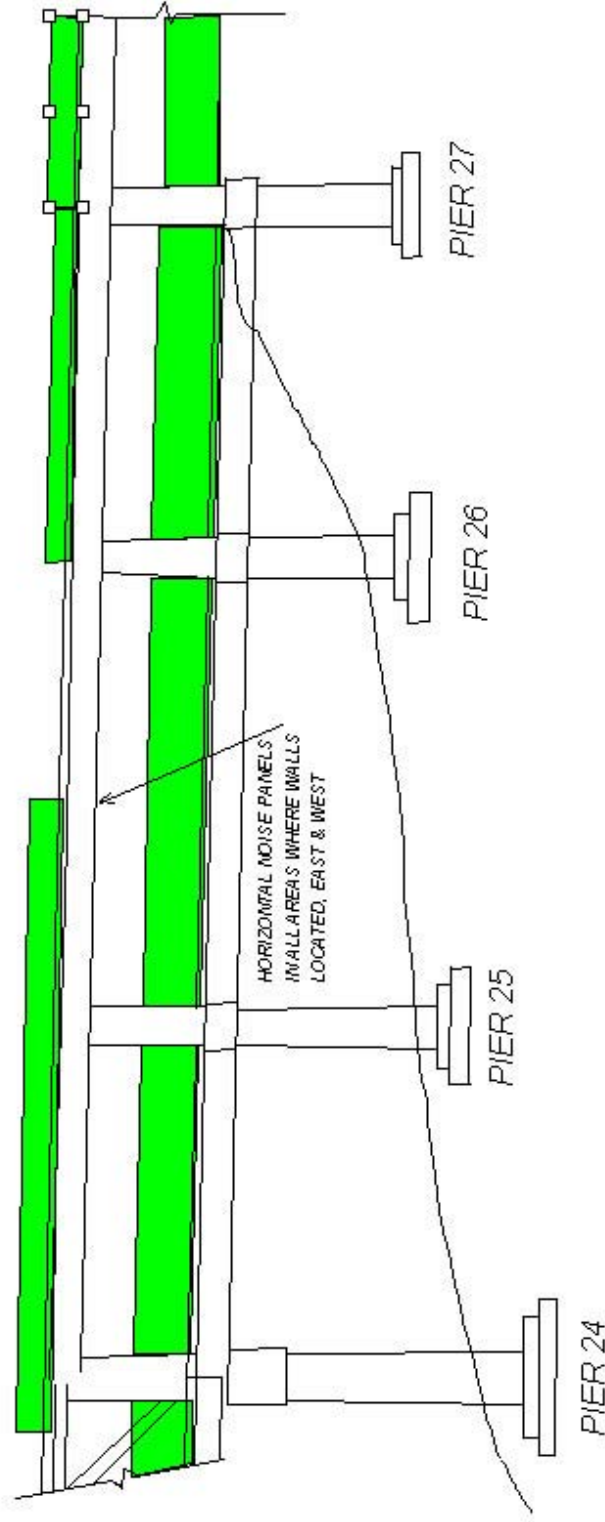
STEEL TRUSS – MAIN SPAN

FACING WEST – WEST SIDE SHOWN



SOUTH CONCRETE APPROACH

FACING WEST - WEST SIDE WALLS SHOWN



NORTH CONCRETE APPROACH

FACING WEST – WEST SIDE WALLS SHOWN